

CLAIMS

1. A tablet storage and take-out apparatus comprising:
 - a cylindrical drum which has an axis thereof in a vertical direction and which is so supported as to be rotatable about the axis;
 - drum driving means for driving the drum into rotation;
 - a plurality of tablet cassette mounting bases which are fitted to an outer surface of the drum;
 - a tablet cassette which stores tablets and which is detachably mounted on the tablet cassette mounting base;
 - a guide passage which guides inside the drum tablets discharged from the tablet cassette;
 - a transfer robot which is provided inside the drum so as to be liftable along and also rotatable about the axis, which has a pair of arms for holding a vial, and which transfers the vial held by the arms between a delivery position located outside an opening formed in an upper end or a lower end of the drum and a tablet filling position where the tablets discharged through the guide passage are filled; and
 - control means for controlling a position of at least one of the drum and the transfer robot so that an opening of the vial held by the transfer robot agrees with an outlet of the guide passage.
2. The tablet storage and take-out apparatus according to claim 1, wherein the guide passage has a storage part which stores tablets discharged from the tablet cassette and which has in a bottom thereof an outlet and a shutter for opening and closing the outlet.
3. The tablet storage and take-out apparatus according to claim 2,

wherein the shutter has detection means for detecting open and close states of the outlet of the storage part, and

wherein the control means stops the transfer robot when the detection means detects the open state of the outlet of the storage part.

4. The tablet storage and take-out apparatus according to claim 2 or 3,

wherein, below the shutter, a guide member is provided which guides the tablets discharged from the storage part to the opening of the vial held by the transfer robot.

5. The tablet storage and take-out apparatus according to claim 4, wherein the guide member is fitted to the arms of the transfer robot.

6. The tablet storage and take-out apparatus according to claim 5, wherein the shutter is forced in such a direction as to constantly close the outlet of the storage part, and

wherein the shutter has a contact part which is contacted by the guide member to thereby open the storage part when the transfer robot moves.

7. The tablet storage and take-out apparatus according to claim 1, wherein the transfer robot comprises:

a frame which has a lifting guide extending along the axis of the drum and whose upper and lower ends are so supported as to be rotatable about the axis of the drum;

a base which is liftably fitted to the lifting guide and which has the arms;

rotation driving means for driving the frame into rotation about the

axis of the drum;

lifting driving means for lifting the base; and

arm driving means for driving the arms.

8. The tablet storage and take-out apparatus according to claim 7, wherein the transfer robot further has: a boom which is fitted to the base so as to be movable back and forth in a horizontal direction; and horizontal driving means for moving the base back and forth in the horizontal direction, and

wherein the arms are fitted to a leading end of the boom.

9. The tablet storage and take-out apparatus according to claim 8, wherein the arms are so provided as to be swingable between a horizontal position where the opening of the vial held by the arms faces straight upward and a tilt position where the opening faces obliquely upward while being tilted at 45 degrees, and

wherein the boom has swinging means for swinging the arms.

10. The tablet storage and take-out apparatus according to claim 1, wherein the arms are provided with two rollers and two or one rollers on one side and another side of the vial, respectively, each roller having a shaft extending in a height direction of the vial held so as to support a side surface of the vial at four or three points.

11. The tablet storage and take-out apparatus according to claim 1, wherein the arms are provided with two rollers and two or one rollers on one side and another side, respectively, of each of an upper and a lower portions of the held vial, each roller having a shaft extending in a height direction of the vial so as to support a side surface of the vial at eight or six

points.

12. The tablet storage and take-out apparatus according to claim 1, wherein the drum driving means comprises:

a motor;

a transmission mechanism for transmitting a driving force of the motor to the drum; and

moving means for moving the transmission mechanism between a transmission position where the driving force is transmitted from the motor to the drum and a blocking position where the driving force from the motor to the drum is blocked.

13. The tablet storage and take-out apparatus according to claim 12,

wherein the transmission mechanism further has between the motor and the drum an intermediate transfer mechanism, which is moved by the moving means between the transmission position and the blocking position.

14. The tablet storage and take-out apparatus according to claims 12 or 13,

wherein the moving means includes a lever which can be manually operated from outside.

15. The tablet storage and take-out apparatus according to claim 12,

wherein there are provided origin detection means for detecting an origin of the drum in a rotation direction thereof, and origin search means for searching an origin of the drum by rotating the drum by the drum driving means until the origin detection means detects the origin of the drum.

16. The tablet storage and take-out apparatus according to claim 15,

wherein the origin detection means comprises a first sensor and a

second sensor which are adjacent each other, and which, when the first sensor first detects an origin, a position thereof is a left rotation limit, and when the second sensor first detects an origin, a position thereof is a right rotation limit.

17. The tablet storage and take-out apparatus according to claim 16, wherein the origin detection sensor has a third sensor between the first sensor and the second sensor, and

wherein the drum driving means stops the drum when either the first sensor or the second sensor detects an origin and then the third sensor detects an origin.

18. The tablet storage and take-out apparatus according to any of claims 15 to 17,

wherein drum rotation position detection means for detecting a rotation position of the drum from the origin is provided, and

wherein, when the origin of the drum is detected by the origin detection means, the rotation position detected by the drum rotation position detection means is reset.

19. The tablet storage and take-out apparatus according to claim 1, wherein the drum comprises: at least two body members each having a circular-arc cross section; and rotary support rings fitted to an upper end and a lower end of the body members, and

wherein at least one of the body members has the upper end and the lower end thereof rotatably fitted to the rotary support rings so as to be capable of opening and closing the inside of the drum and also has a holding member for holding a closed state.

20. A tablet storage and take-out apparatus characterized by comprising:

- a tablet supply part comprising: a cylindrical drum which has an axis thereof in a vertical direction and which is so supported as to be rotatable about the axis;

- drum driving means for driving the drum into rotation;

- a plurality of tablet cassette mounting bases which are fitted to an outer surface of the drum;

- a tablet cassette which is detachably mounted on the tablet cassette mounting base;

- and a guide passage which guides inside the drum tablets discharged from the tablet cassette, and supplying tablets in accordance with prescription;

- a vial supply part which stores a large number of vials by size and which supplies, one by one, the vials of a size suitable to be filled with tablets in accordance with prescription data;

- a cap supply part which stores caps for plugging the vials and which supplies the caps one by one;

- a capping part which plugs the cap supplied from the cap supply part in the vial filled with the tablets;

- a storage part which stores the vial filled with the tablets and plugged with the cap so that the vial can be taken out by an operator;

- a first transfer robot which holds and transfers the vial taken out from the vial storage take-out part;

- a second transfer robot which has a pair of arms for holding the vial,

which is provided inside the drum so as to be liftable along and rotatable about the axis of the drum, and which holds and transfers the vial;

a third transfer robot which delivers an empty vial transferred from the first transfer robot to the second transfer robot and also which delivers the vial filled with the tablets and transferred by the second transfer robot to the vial closing part; and

a fourth transfer robot which transfers the vial transferred by the third transfer robot to the storage part.

21. The tablet storage and take-out apparatus according to claim 20, wherein, when the tablet supply apparatus has no tablets corresponding to prescription data, the first transfer robot delivers the vial to the third transfer robot without delivering the vial to the second transfer robot and the third transfer robot delivers the vial to the fourth transfer robot without delivering the vial to the capping part.

22. The tablet storage and take-out apparatus according to claim 20 or 21, further comprising a photographing part which photographs from above the vial filled with the tablets for audit of the vial,

wherein the third vial transfer arm transfers the vial filled with the tablets and transferred by the second vial transfer arm to the tablet photographing part and then delivers the vial to the vial closing part.

23. The tablet storage and take-out apparatus according to any of claims 20 to 22, further comprising a labeling part which puts a label with prescription information printed thereon on the vial supplied from the vial supply part,

wherein the first transfer robot transfers the vial to the labeling part

and delivers the vial provided with the label to the second transfer robot.

24. A tablet storage and take-out apparatus, characterized by comprising:

a cylindrical first drum which has an axis thereof in a vertical direction, which is so supported as to be rotatable about the axis, and which has a first opening in a part thereof;

first drum driving means for driving the first drum into rotation;

a cylindrical second drum which is arranged to an outer side of the first drum, which is coaxial with the axis of the first drum, which is so supported as to be rotatable about the axis, and which has a second opening in a part thereof;

second drum driving means for driving the second drum into rotation;

a plurality of tablet cassette mounting bases which are fitted to an outer surface of each of the first and second drums;

tablet cassettes which are detachably mounted on the tablet cassette mounting bases of the first and second drums;

a guide passage which guides inside the first and second drums tablets discharged from the tablet cassettes;

a transfer robot which is provided inside the first drum so as to be liftable along the axis and also rotatable about the axis, which has a pair of arms for holding a vial, and which transfers the vial held by the arms between a delivery position located outside an opening in an upper end or a lower end of the first and second drums and a tablet filling position where the tablets discharged through the guide passages of the first drum and the

second drum are filled; and

control means for controlling a position of at least one of the first drum, the second drum, and the transfer robot so that an opening of the vial held by the transfer robot agrees with an outlet of the guide passage.

25. The tablet storage and take-out apparatus according to claim 24, wherein the opening of the first drum is provided at a plurality of positions in a circumferential direction.

26. A tablet storage and take-out apparatus comprising:

a cylindrical first drum which has an axis thereof in a vertical direction, which is so supported as to be rotatable about the axis, and which has a first opening in a part thereof;

first drum driving means for driving the first drum into rotation;

a cylindrical second drum which is arranged to an outer side of the first drum, which is coaxial with the axis of the first drum, which is so supported as to be rotatable about the axis, and which has a second opening in a part thereof;

second drum driving means for driving the second drum into rotation;

a plurality of tablet cassette mounting bases which are fitted to an outer surface of each of the first and second drums;

tablet cassettes which are detachably mounted on the tablet cassette mounting bases of the first and second drums;

a guide passage which guides inside the first and second drums tablets discharged from the tablet cassettes;

a main transfer robot which is provided in the first opening of the

first drum so as to be liftable along an axial line parallel to axis of the first drum and also rotatable about the axial line, which has a pair of arms for holding a vial, and which transfers the vial held by the arms between a delivery position located outside an opening in an upper end or a lower end of the first and seconds drums and a tablet filling position where the tablets discharged through the guide passages of the first drum and the second drum are filled;

a sub-transfer robot which is provided in the first opening of the first drum so as to be liftable along an axial line parallel to the axis of the first drum and also rotatable about the axial line, which has a pair of arms for holding a vial, and which transfers the vial held by the arms between a delivery position where the vial held by the arm is delivered to the main transfer robot and a tablet filling position where the tablets discharged through the guide passage of the second drum are filled; and

control means for controlling a position of at least one of the drum and the transfer robot so that an opening of the vial held by the transfer robot agrees with an outlet of the guide passage.